REMARKS/ARGUMENTS

Favorable reconsideration of the present application is respectfully requested.

Claims 2-3 have been cancelled and the subject matter thereof has been incorporated into Claim 1. Claim 1 has also been amended to recite a member positioned to maintain the cylindrical cooling vessel concentrically positioned within the work. Basis for this is found in the spacer 29 (page 12). Claim 4 recites that the member maintains a clearance between the inside surface of the work and the outside surface of the coolant vessel of 100 mm or less, while new Claim 14 recites that the member maintains a clearance between the inside surface of the work and the outside surface of the coolant vessel of 30 mm or less (page 7). New Claim 15 recites that the member comprises a spacer positioned between the outside surface of the cylindrical cooling vessel and the inside surface of the work. New Claim 16 presents rejected Claim 6 in independent form. Method Claims 11-13 have been cancelled.

Claims 1-3 and 5-13 were newly rejected under 35 U.S.C. § 102 as being anticipated by U.S. patent 5,439,715 (Okamura). However it is respectfully submitted that the amended claims define over this reference.

As has already been explained, Claim 1 recited a film deposition system wherein the cooling device is insertable into and drawable from an internal space of the work through an opening part of the work to cool the work from the inside. Claim 1 now recites a cylindrical cooling vessel having an outside surface and being adapted to circulate therein a coolant for cooling the work, the cooling vessel being insertable axially into and drawable from the internal space through the opening part of the work to cool the work from the inside.

The radiative heat transfer rate via the cooling vessel is proportional to surface areas of the cooling vessel and work, and so the clearance between the cooling vessel and the work should be made small, e.g., less than 100mm, in order to maximize the surface area of the cooling vessel (page 7, lines 10-14). This, in turn, increases the criticality of maintaining the cooling vessel concentrically positioned within the work in order to ensure even cooling and prevent interference between the cooling vessel and the work. Accordingly, the present invention provides a member to maintain the cylindrical cooling vessel concentrically positioned within the work (page 12, lines 12-16). For example, the member can be the spacer 29 positioned between the outside surface of the cylindrical cooling vessel and the inside surface of the work.

Okamura discloses a film deposition apparatus in which a temperature controlling device 113, 213 is positioned inside a cylindrical substrate 205. The temperature controlling device is a two stage device in which hydrogen gas in conduit 213''' is cooled by water in conduits 213' and 213'', and is discharged against the inner surface of the substrate by nozzles 214 (Fig. 2; col. 9).

There is no evidence in Okamura of a member positioned to maintain the temperature controlling device concentrically positioned within the substrate. Accordingly the amended Claims 1 and 4-14 are not anticipated by Okamura. Additionally, there is no evidence in Okamura of a spacer positioned between the outside surface of the temperature controlling device 113, 213 and the inside surface of the substrate as the member positioned to maintain the temperature controlling device concentrically positioned within the substrate. Accordingly new Claim 15 also defines over Okamura.

Additionally, it would not have been obvious for one skilled in the art to have provided the claimed member or spacer in Okamura. Since Okamura provides convective cooling by blowing a cooling gas against the substrate, maximizing the surface area of the temperature controlling device 113, 213 would not have been important, and so a small clearance requiring a spacer would not be required. Moreover, the presence of an obstruction such as a member or spacer in the clearance would impede the flow of cooling gas in the clearance and would be undesirable. The claims thus define over this reference.

Claim 4 further recites that the clearance is 100 mm or less, and Claim 14 recites that the clearance is 30 mm or less. Claim 4 was rejected under 35 U.S.C. § 103 as being obvious over Okamura. According to the Office Action, the claimed clearance is merely an optimum range which can be determined by routine experimentation. However, a rejection on this basis requires that the prior art recognize that the variable to be optimized is a result effective variable. MPEP § 2144.05(II)(B). A small clearance would not be a result effective variable in Okamura. Indeed, a small clearance would be undesirable in Okamura since it would restrict the flow of cooling gas to the surface of the substrate: optimization of the clearance in Okamura would result in a large clearance and not a small clearance. For this reason as well, Claims 4 and 14 define over Okamura.

New independent Claim 16 recites the feature of Claim 6 that a work holding device comprising a rotating table for rotating the work around a rotating shaft that is the axis of the internal space has a moving means for moving the work separately from the rotating table, and the cooling vessel is provided so as to move following the movement of the work by the moving means. For example, as seen in Figs. 3 and 5, a rotating table 21 rotates the work 2 around the axis of the internal space. Additionally, either the gears 23-24 (Fig. 3) or the gears 32-33 (Fig. 5) rotate the work separately from the table 21. In each case, the cooling vessel 4 is caused to follow the movement of the work. These features are not taught in Okamura. In Okamura the substrate simply rotates about its own axis. There is no rotating table for rotating the work around a rotating shaft that is the axis of the internal space or moving means for moving the work separately from the rotating table. Claim 16 therefore defines over this reference.

Concerning the rejection under 35 U.S.C. § 112, the disclosure of a specific means used to insert or withdraw the cooling device is not critical to the invention and need not be particularly disclosed. The particular means that is used to insert or withdraw the cooling device is unimportant so long as the cooling device can be inserted and withdrawn thereby. One skilled in the art could use any known device for lifting and lowering a cylinder, such as an overhead hoist, or even by hand. Since 35 U.S.C. § 112 only requires that the invention be enabled for one skilled in the art, and since an overhead hoist or manual manipulation would certainly be within the skill of one skilled in the art, it is respectfully requested that this rejection be withdrawn.

Applicants therefore believe that the present application is in a condition for allowance and respectfully solicit an early Notice of Allowability.

Respectfully submitted,

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